

WHAT IS CLAIMED IS:

1. An electromagnetic actuator comprising:  
a stationary member having a first core section carrying a first coil wound around its periphery;  
5 a movable member magnetically coupled with said stationary member with a gap therebetween and having a second core section carrying a second coil wound around its periphery;  
a support member for displaceably supporting said  
10 movable member relative to said stationary member; and  
an electric current source for displacing said movable member relative to said stationary member by supplying electricity to said first and second coils.
- 15 2. An electromagnetic actuator according to claim 1, wherein  
said first coil and said second coil are electrically connected to each other and electrically energized by a single electric current source.
- 20 3. An electromagnetic actuator according to claim 1, wherein  
said first coil and said second coil are wound respectively around said first and second core sections  
25 in such a way that the oppositely disposed parts of the stationary member and the movable member show opposite magnetic poles.

4. An electromagnetic actuator according to claim  
1, wherein

said first coil and said second coil are wound  
respectively around said first and second core sections  
5 in such a way that the oppositely disposed parts of the  
stationary member and the movable member show same  
magnetic poles.

5. An electromagnetic actuator according to claim  
10 1, wherein

the oppositely disposed parts of the stationary  
member and the movable member are toothed like combs  
and the corresponding toothed parts are interdigitally  
arranged with a gap separating them.

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6. An electromagnetic actuator according to claim  
1, further comprising:

a substrate carrying thereon said stationary  
member rigidly secured thereto, said support member  
20 comprising a spring displaceably supporting said  
movable member relative to said substrate.

7. An electromagnetic actuator according to claim  
6, wherein

25 said spring comprises a pair of hinged springs,  
each being rigidly secured to said substrate at an end  
thereof and to said movable member at the other end

thereof.

8. An optical scanner comprising:

an electromagnetic actuator according to any of  
5 claims 1 through 7 above; and

a mirror arranged on the movable member of said  
electromagnetic actuator.

9. An optical scanner comprising:

10 an electromagnetic actuator according to any of  
claims 1 through 7 above; and

a lens arranged on the movable member of said  
electromagnetic actuator.

15 10. A method of preparing an electromagnetic  
actuator comprising a stationary member having a first  
core section carrying a first coil wound around its  
periphery, a movable member magnetically coupled with  
said stationary member with a gap therebetween and  
20 having a second core section carrying a second coil  
wound around its periphery and a support member for  
displaceably supporting said movable member relative to  
said stationary member, said method comprising steps  
of:

25 forming said stationary member, said movable  
member and said support member on a single substrate by  
means of photolithography and plating; and

removing the substrate from under the movable member so as to make the movable member to be supported by the substrate by way of the support member.

5           11. A method of preparing an electromagnetic actuator according to claim 10, wherein  
said substrate is a silicon substrate.

10           12. A method of preparing an electromagnetic actuator according to claim 11, wherein  
said step of removing the substrate is a step of anisotropically etching the silicon substrate from the rear surface thereof.